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JOURNAL

OF THE

MASSACHUSETTS ASSOCIATION

OF

BOARDS OF HEALTH

An Official Quarterly Record of
Information for the Public

SEPTEMBER, 1897

Proceedings of the July Quarterly Meeting.

Subjects: Bacteria and Acidity of the Milk Supply of Boston — Sterilization and Pasteurization of Milk.

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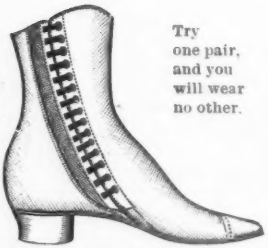

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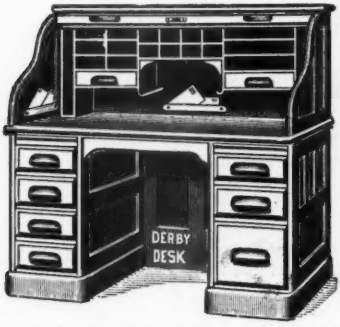

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JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

July Quarterly Meeting, 1897

SUBJECTS: Bacteria and Acidity of the Milk Supply of Boston — Sterilization and Pasteurization of Milk

THE JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston in March, 1890, with the following objects: the advancement of sanitary science in the Commonwealth of Massachusetts; the promotion of better organization and co-operation in the local Boards of Health; the uniform enforcement of sanitary laws and regulations; and the establishment of pleasant social relations among the members of the Association.

All persons holding appointments as members of a Board of Health in a Massachusetts city or town, the executive officers of such a local board, and the members of the State Board of Health are eligible to membership. Other persons may be elected members by vote of the Association. The annual dues are one dollar and fifty cents.

The Association holds four regular meetings each year, the annual or January meeting always being held in Boston.

THE OFFICIAL JOURNAL OF THE ASSOCIATION is a quarterly publication, containing the papers read at the meetings, together with verbatim reports of the discussions following them. No part of this matter is printed in any other periodical.

The JOURNAL will present, from quarter to quarter, a fair and adequate picture of the progress of practical sanitary science as applied to the needs of a modern community. The various subjects which are reviewed in the quarterly meetings of the Association are treated by experts qualified to speak from daily experience in Public Health offices, who, as men of science, are careful to be scientific and comprehensive, and who, as public officers, are no less careful to speak pertinently and so as to be easily intelligible to the layman.

The JOURNAL, in a word, appeals to all whose interests touch the questions of sanitation and hygiene,— to the architect, the school-committee-man, the manufacturer, the contractor, and, above all, to the busy practitioner who has no time for any reading but what is brief and to the point.

The subscription price of the JOURNAL is one dollar a year, payable in advance. Single numbers, twenty-five cents. It is on sale at the Old Corner Bookstore, and at Smith & McCance's Bookstore, 57 Bromfield Street, Boston.

All communications to the Association should be addressed to the Secretary, **EDWIN FARNHAM, M.D., City Hall, Cambridge, Mass.**

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JOURNAL OF THE

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

ORGANIZED 1890.

[The Association as a body is not responsible for statements or opinions of any of its members.]

VOL. VII. September, 1897. No. 3

JULY QUARTERLY MEETING

OF THE

Massachusetts Association of Boards of Health.

The July quarterly meeting of the Massachusetts Association of Boards of Health was held at Gallop's Island on Thursday afternoon, July 29, the President, Dr. H. P. Walcott, in the chair. The following is a report of the proceedings: —

THE PRESIDENT.—Will the Association come to order? The Secretary will read the record of the last meeting.

THE SECRETARY.— Mr. President, there are records of two meetings to be read.

THE PRESIDENT.— Well, read the two, please.

The records of the January and April meetings were read.

THE PRESIDENT.— Is there any amendment to be made to the records read to you? If not, they will be understood to be the records of the last two meetings of the Association. In behalf of

the Executive Committee I would report to the Association the names of

A. C. BURNHAM . . . . . Cambridge,
F. W. RUSSELL, M.D. . . . . Winchendon,
E. W. YOUNG, M.D. . . . . Everett,

as candidates for membership in this Association. Is it your wish that they be elected members of this Association? If so, you will signify it by saying aye. [The vote was taken, and the President declared the above-named gentlemen elected to membership.] Is there any business incidental to the affairs of this Association which any member desires now to bring forward? If not, the report of the committee "on Rules for Protection of Milk Supplies from Pollution and for the Investigation of Cases and Epidemics of Disease supposed to result from such Pollution" will be presented by Mr. Gove.

REPORT OF THE COMMITTEE.

The committee appointed to consider and report upon "rules for protection of milk supplies from pollution and for the investigation of cases and epidemics of disease supposed to result from such pollution" have not formulated rules, and, if desired to do so, must ask for further time.

The committee prefers to present a plan which may be adopted by the local boards of health for the protection of the milk supply for the locality rather than attempt to formulate rules for carrying such plan into effect. The plan recommended is as follows: —

The object to be attained is *the greater purity of the milk supply.*

The essentials to the attainment of this object are *improvements at the source of supply and in handling the milk.*

The method to be adopted is that all local dealers in milk be licensed by the local board of health; *i.e.*, the business shall not be carried on without such license.

RULES TO BE OBSERVED IN GRANTING SUCH LICENSES.

1. No license shall be issued except on declaration by the proposed licensee of his sources of supply.

2. No license shall be issued unless all sources of supply so declared conform to a certain standard.

(*Mem.*— This standard might well be fixed by a vote of this Association.)

In order to enable each local board to ascertain whether such sources do so conform, information should be at their disposal, and this information may well be supplied by a system of State inspection of such sources, the reports of which inspection should be at the service of all local boards; and, in the absence of such system, such information may be supplied by the co-operation of local boards.

The great result which may be obtained by a system of licensing the local dealer or distributor is that, in case he fails to satisfy the local board that the milk he proposes to supply will probably be free from objectionable impurities or conditions he will be unable to carry on his business; and, if this inability arises from the shortcomings of the milk producer, he will bring pressure on the producer to make his conditions conform to those which are indicated as likely to produce cleaner and safer milk, and that, unless this be done, he will buy milk only from those whose conditions do so conform.

By the requirements the following points should be covered: —

1. *Cleanliness of stable and wholesome conditions of keeping animals.*

Among tests of cleanliness which may be applied is that of observing dirt indicated by separator slime or sediment of tube, also excess of bacteria. Cows, being sources of food, should be tended and kept with as great or greater care than horses used only for burden or pleasure. Barns should be well ventilated.

2. *Health of the animals.*

The best and most approved methods of determining the existence of tuberculosis or other disease, such methods to be determined upon by each board for itself, should be employed, and the sale and use of milk from a tuberculous or otherwise diseased cow prevented so far as practicable.

3. *Cleanliness and freedom from disease of the milkers.*

The operation of milking should be looked after with special care. Above all, the hands of the milker should be carefully washed just before he begins to milk, his own personal cleanliness being even

more important than that of the cows. No person should be retained as a milker who, or any member of whose family, is affected with typhoid fever, scarlet fever, diphtheria, or any other infectious disease.

4. *Cleanliness of milk-cans.*

Before a can is used, it should be thoroughly sterilized by the use of steam or boiling water.

5. *Prevention of pollution of source of water supply used in washing cans, etc.*

6. *The milk should, as soon as possible after it has been drawn, be filtered, placed in a clean receptacle, thoroughly chilled or cooled, and started on its way to the consumer.*

HANDLING.

Points to be covered as above: —

1. Length of time consumed in transit between source of supply and consumer.

This time should be the shortest practicable necessary to secure an adequate supply.

2. Temperature of milk in transit.

The milk while in transit should be kept ice-cold, or as nearly so as practicable.

3. Method of delivery to consumer.

The preferable method of delivery is one in which the milk is poured from the large can directly into a vessel which does not leave the consumer's house.

4. The practice of returning uncleaned cans and stoppers from the dealer to the producer is to be condemned. Before so returning them, the dealer should be required to see that they are thoroughly cleansed and sterilized by the use of steam or boiling water.

Inasmuch as milk is one of the best culture media for micro organisms, and is always liable to become infected with the organisms of disease, and, further, inasmuch as the process of Pasteurization is known to destroy such organisms, it is recommended by a majority of the committee that, as far as possible, all milk be Pasteurized before it is sold.

In the case of epidemics supposed to be due to polluted milk the

usual methods of epidemiology should be followed, so far as locating the cases, fixing the dates of attack, and seeking for a common bond are concerned. If it then appears that the milk supply may be at fault, every endeavor should be used to connect the epidemic in question with one or more cases of disease on the farm supplying the milk or among the persons handling it. It is not enough to discover cases of the disease in question among those producing or handling the milk: the dates of such case or cases must be such as to allow a reasonable probability that the epidemic is secondary to the cases discovered. If such cases are found, it is important to discover the precise connection between the person or persons affected and the milk supplied. Such connection will usually be found to consist of milking, washing pails or cans, or testing or handling the milk in milk-houses. Contact by the hands or fingers of persons diseased with milk or milk utensils, is a ready method of infection.

THE PRESIDENT.— The next business in order is the paper, rather incorrectly stated in the programme, upon the "Milk Supply of Boston." The title should properly be "Paper upon Bacteria and Acidity of the Milk Supply of Boston," by Professor William T. Sedgwick, prepared with the assistance of Mr. H. W. Marshall; and Professor Sedgwick will kindly read it.

BACTERIA AND ACIDITY OF THE MILK SUPPLY OF BOSTON.

A FAMILIAR TALK.

BY PROFESSOR WILLIAM T. SEDGWICK.

Mr. President and Gentlemen of the Association,— When this matter came up in the shape of a paper which was read at the meeting before the last on the "Protection of Public Milk Supplies from Pollution," it was brought out at the discussion that it was very desirable, if possible, to have some tests or some methods by which it should be possible to discover from the actual condition of the milk itself

the sanitary condition of that milk. That, for example, would be of great service in treating such a problem as the control of milk from another State or from one town into another town on its journey; and I had long had in contemplation an investigation of the relation between the fermentation of the milk — the ordinary sourness and the like — as produced by bacteria and the acid actually produced, believing that, if that were worked up, it might possibly give us some such method, or at least might be an aid looking in that direction. And, accordingly, I invited one of my students who has recently graduated, who was then about making his thesis, to work under my direction upon the milk supply of Boston, studying the numbers of bacteria present, and correlating them with the development of acidity or growing old of the milk; and another was put on the question of the influence of dirt in milk upon its aging and acidity. Of course, it was firing more or less in the air, as investigation of that kind always must be. We did not know how we were coming out when we began. We only knew that the Boston milk supply, like all public milk supplies, contained a great many bacteria. We also knew that this was not the fault, as a rule, of the contractors and milkmen, but that in spite of them it does frequently sour, and that all milk necessarily sours as it grows older. In fact, it might be said that one problem, and a most serious problem, of the milk supply is to get the milk to the consumer without its souring; and the results of the investigations have been, to me at least, quite interesting.

In the first place we took careful pains to confirm the older results as to the actual pollution of the milk by bacteria. In company with a former student of mine, Mr. John L. Batchelder, in 1890 I made the first investigation that had ever been made in this country — one of the first, I think, anywhere — upon the bacterial condition of the public milk supply, and showed that, when the milk arrived in Boston, it contained on the average a million or more of bacteria per cubic centimetre, and when it got on the tables of the people, and into the groceries especially, it contained a good many more than that; in other words, that it was a fluid very rich in bacteria. Ever since that time, and also since this spring, I have had the hope that these results, if confirmed, connected with the acidity, might not only

throw some light on the possible means of detecting the actual sanitary condition of milk, but also might throw a good deal of light on the causation of cholera infantum. Cholera infantum is a reproach, of course, to sanitation. Our great cities in the summer see children mowed down by this disease, and we know very well that it is not merely the hot weather. That has been proved time and again, yet it is something that goes along with the hot weather; and I had hoped that, if we could show that milk was full of acid and rich in bacteria, it would throw great light on the causation and control of cholera infantum.

Now, without saying more of what we undertook to do, let me say what Mr. Marshall has found. In the year 1890 experiments began with the cow and with what I call, and would like to have generally called, normal milk. Normal milk is milk as its flows from the teat of a healthy cow or mammal. Such milk is, of course, warm, free, or nearly free, from bacteria, clean, and sweet. The first thing that we did, then, was to find out just how sweet it is, in order to be able to trace its souring, its progressive growing old; and for that purpose Mr. Marshall visited farms to draw milk directly from the teat of the cow into bottles carefully prepared for the purpose, and tested the acidity and the richness in bacteria. In the first place twenty samples of such normal milk drawn from different cows gave, on the average, an acidity indicated by the figures 1.66. I need not give you the chemical significance of that. It would take us too far into technicalities. I will ask you to bear in mind that figure,— that normal milk, as drawn from the cow in the neighborhood of Boston, has an acidity such that it will neutralize under certain conditions the amount of alkali represented by the figures 1.6, those being standard conditions.

You will see that normal milk is not quite sweet; that is to say, it already contains a little acid, but, as the figures especially in these analyses would show, it is very little. To go to a very extreme sour milk, I tested the milk; and it contained, on the average, 7.9, had an acidity of 7.9, as opposed to 1.6, or 16, if you choose, of normal and 79 the sour milk. Now the whole process of the aging of milk is the passage from 16 to 79 degrees of acidity, and right here I would like to mention a very interesting fact.

In 1891 a German investigator, an assistant physician at the University of Breslau, published a paper on the reaction of cow's milk and human milk, using precisely the same methods that we have used, and getting results, on the whole, very well agreeing with these, his average having been 1.9 for the normal milk, while ours was 1.6, 16 as opposed to 19. In other words, Boston milk compares with Breslau milk as 16 to 19 in acidity,—a very little bit sweeter; but we do not know exactly how he took his samples, or the numbers of cows used, or the time of year, or period of lactation. All these things have their influence. So I think it is perfectly fair to say that the results agree remarkably.

Now the further history of the souring of the milk, or its growing older, further fermentation, consists simply in passing from 16 to 79. The problem for the milkman is to keep it from so passing. The problem of the sanitarian is the same, so far as the supply of sweet and normal milk is concerned. In the case of this normal milk, to part company with that, no particular attention was paid as to whether it was the first or last part of the milking. The German investigator found that the milk was almost the same in the first and last portions, but not quite. It was a little bit more acid in the first portion than the last. The cows in those cases were mixed breeds, and were fairly clean. At the time of milking there was no bedding on the floor: the cows were quiet and peaceable. Other precautions, such as washing the hands or washing the cows, were not observed. In this case the milk passed through a two-inch sterilized funnel into a sterilized bottle.

Now milk contains bacteria under ordinary conditions, as milk is drawn by the ordinary milkman: it is seeded with bacteria. It is still an open question whether in the teat of the cow there are resident a few bacteria. It is claimed in a recent article of the bureau of animal industry that there are some such. It has been claimed by almost all investigators,— I perhaps have no right here to say it, but I personally do not believe that it is true,—all the observers who get this result got occasionally sterile samples; and I believe, if they took precautions enough, they would nearly always get sterile samples, and that, in cases where they did not get them, it would be either due to disease or to accidental introduction of bacteria from

the air. By passing a sterile catheter up into the cow, I have frequently got sterile milk from the cow. That does not, however, exclude the possibility that fore milk, as it is called, milk in the duct of the teat at the beginning of milking, may contain a few bacteria; but, personally, I believe that is very unlikely, although many investigators claim that the duct is more or less charged with bacteria. At any rate, the number is low; that is, dozens or hundreds or units even instead of thousands or millions in freshly drawn milk.

This sweet and comparatively bacteria-free milk then proceeds to grow old or ferment by virtue of these same bacteria, and the process is a gradual one under ordinary conditions: in hot weather, a rapid one; when the milk is refrigerated, a very slow one. We have been very much aided in this investigation by milk contractors and their agents. They have put at our disposal every possible facility, and we are very glad to return them our heartiest thanks for all their kindness.

Now it will be interesting to see how the milk arrives in Boston after it has started with an acidity of 16 or 1.6, if you prefer, and a very low charge of bacteria.

The average of thirty-seven samples taken from various contractors was 1.71,— that is, instead of 166 it was only 171 in acidity when it arrived in the city,— as it seems to me, a really fine showing, proving that milk when transported on the trains is very thoroughly protected *en route* from souring; and, if you will look for a moment, you may see that this must necessarily be so. The one danger that threatens the contractor or the ordinary milkman is souring of his milk, because people won't buy sour milk. They will buy dirty milk, they will buy old milk, anything except sour milk. Milk that is sour is sent back to the farmer. By the process of testing I shall describe, I would like to have the dealer or contractor determine whether it is sour or not, and, if it is sour, send it back. If the milk actually taken into the city and distributed by the great contractor was hardly richer in acidity than normal milk, if it was a little richer, as may be expected, the reason, as we know from experiments, is it is so well refrigerated, because by icing milk you can keep acidity down; but I should say you cannot keep bacteria down by ordinary icing. That is shown by these facts. While the acidity is 1.71 as

against 1.66 of normal milk, bacteria, instead of being dozens, hundreds, or units sometimes per cubic centimetre, are over seven million per cubic centimetre. In other words, those bacteria that produce the acidity are kept down by refrigeration, but a lot of bacteria that do not produce acidity were able to grow at that low temperature to the degree that milk was really aged seriously, although it was not damaged seriously by acid. From a sanitary point of view it was damaged very much, but from the chemical point of view it was not; and nothing is more natural than that might be the case, because the milk supply involves the question of getting milk to the people without its being sour. In this milkmen have done admirably in aiding us, and are entitled to our thanks for it. That, however, is milk as it arrives in the city; and, if any one could go and get that milk, it would be comparatively sweet, but it would be very high in bacteria. I should like to say that I repeated these counts on bacteria because we have more decidedly improved methods over those of seven years ago, and I was anxious to see whether my results there came within or outside the limits of error. I found that they were well within, that the numbers were really much larger than we used to find, and that by the modern methods we got a good many more bacteria. The contractor sells to the dealer: the dealers take it to their milk-house, ice it, keep it some time, and then finally deliver it; and, to go to the other extreme, probably the worst condition we shall find any milk in, in the city of Boston, is to be found in the groceries, especially in the tenement-house district, — groceries to which the people send for a cent's worth of milk. Mr. Marshall has been to the North End, Charlestown, and Cambridge, and all through the city, and has done it all through the spring; and up to the present time he has found a very unsatisfactory state of affairs in these groceries.

It may not be known to all of you, although it must be to many, that a good many cheaper stores will advertise milk below the regular rates,— "Pure milk, four cents a quart!" "Pure milk, five cents a quart!" That means they do it at a loss, in order to get people to come to their shops and buy other things. And those people, since they lose on the milk, are not very careful about it. The cans will not be very thoroughly iced. They stand upon the

counters and behind the counters, and in hot weather there might be very serious results from bacteria. Up to June 8, or, I will say, July, we had a very cool season. We have not had the usual hot weather through the spring; and it is also to be noted we have not had the usual cholera infantum so far, and the milk is particularly good this year, giving better results than we should get in the ordinary season. Up to June 8 the average of one hundred and four samples taken from these cheap groceries gave an acidity practically normal, 1.6, the numbers of bacteria hardly above ordinary, eleven millions, whereas the ordinary, when it arrived in the city, might average seven millions. That means that, with the cool weather we have had through the spring, the treatment was so good that we got nothing very bad; but now, during June, the thirty samples gave an average acidity of 1.7. It had gone up a tenth; and bacteria had gone up two millions,— nine millions. During July, when, you remember, we had some very hot weather, there was a tremendous jump in acidity, the average of seventy-nine samples giving 2.11 acidity,— a very large amount comparatively,— and the number of bacteria per cubic centimetre nineteen millions, the amount previous to June 8 having been 16 as against 21 in acidity, and twelve millions as against twenty millions, during this hot time and the rest of July to date; but to this company it means that, as the season goes on, the bacteria are increasing in those groceries, and the acidity is increasing, so that people who are buying that milk are buying sourer and more decayed, fermented milk. What it will amount to in August, if the thing continues, we do not know; but we are having a very cool season, and we are probably not going to get as high results as in the ordinary season. It will be interesting to see, too, if cholera infantum follows the same rule, as I think very likely it may.

Some tests of buttermilk were made. The average of five samples showed an acidity of 7.9. I spoke of the effects of refrigeration, and the excellent work that is done in that direction by the milkmen; but, to show that test and the effect upon acidity and upon bacteria, we got results like these. Some normal milk — that is, milk with an acidity of 1.6 — was put in the refrigerator, at a temperature of from four to sixteen degrees Centigrade; and at the

end of one hour the acidity was normal, 16. The bacteria were 475; and at the end of 288 hours in the refrigerator, or more than ten days, the acidity was only 19 as against 16. The acidity remained low, but the bacteria were ten billions per cubic centimetre. In other words, while the refrigerator is an economical device of great merit, as a sanitary device it is a very serious failure. This milk was not soured, but it was most disagreeable and rotten: it was nauseous. It had ten billions of bacteria in it; and it was milk that nobody could possibly have drunk, and yet it was not sour and was not clotted. So the refrigerator has a very valuable effect in preventing souring, but it is only a very imperfect instrument in keeping milk, from a sanitary point of view.

We have other results of the same sort. Here is one with a very low acidity, 1.1. At the end of 288 hours it was 1.8 in acidity, but the bacteria had risen from eleven thousand to eight billions. Milk like that, of course, is not at all fit to drink; and nobody could drink it as a matter of fact. It is very disagreeable, really rotten, though not sour, due to fermentation; and this we regard as quite a discovery,— that the growth of the lactic acid bacteria can be checked by refrigeration, but other bacteria, which are possibly more dangerous from the sanitary point of view are not to be so checked.

Then, in order to see what can be done by Pasteurized milk, we have examined ten samples of Pasteurized milk. The actual acidity of such milk is slight. Normal milk is 1.6: this had an acidity of 1.7. The normal number of bacteria is units, dozens, or hundreds: this had about seven thousand. That is very low indeed for any milk. It proves this: that Pasteurizing not only keeps down the acidity, but that it also keeps down bacteria. Refrigeration prevents milk from souring, but does not keep it in a strict sense. It keeps it in an economical sense, but not in a chemical or sanitary sense; while Pasteurizing keeps it in every sense.

The moral of all this, it seems to me, is as follows: we know now far more accurately than we have known before the value of a bacterial examination of milk, and that the high numbers of bacteria in that milk mean either dirt or age, — in either case highly objectionable,— and wherever there is an excess of bacteria it can be therefore

said that milk is not in the normal or even in the approximately normal condition, no matter whether the acidity is high or low. If, however, the acidity is high, that is evidence of bad refrigeration; and we found some samples of milk during the hot spell that, instead of being 1.6, gave 6 of acidity. It is well known that in a prolonged hot spell it is very difficult to supply the city with milk, because so much of it sours. It is very difficult then to carry out effective refrigeration. Therefore, while I think I cannot claim that these results have shown all that I hoped,— namely, a method which would enable us to examine milk and learn a great deal more with it directly,— both of these methods are very easy of application, the test for acidity and the test for bacteria; and I believe that the time will come when every well-regulated local board of health will have some one at its laboratory,— I mean in every city of any size, or large towns,— who shall make an examination of milk that is sold, not only in respect to the amount of water that it contains, that being probably the least damaging of all things, but in respect to dirt and its age or staleness, and that in such examination counting the numbers of bacteria and determining the acidity will be of very great value.

THE PRESIDENT.— The report presented by the chairman of the committee and the paper read by Professor Sedgwick are now subjects for discussion or question. Dr. Chapin, you have had a good deal to do with milk in one way and another. What do you think about it?

DR. CHAPIN.— I have had the pleasure of speaking with the committee that formulated this report, and what I think has already been read. The point that seems to me to be of the utmost importance is that the raising of milk to a temperature of say 160 degrees will exterminate bacterial life in that milk. We know that, when suffering from time to time from epidemics of all sorts of contagious disease, some of those epidemics are distributed through the milk supply. I think there can be no question that many of our epidemics — scarlet fever, diphtheria, and, I speak without knowledge, but I presume that measles and various other diseases which owe their existence to some form of bacterial life — are transmitted by

milk. We absolutely know from sad experience that that is true of typhoid fever, and I think some cases of diphtheritic epidemics are known to be due to milk. That certain animals may distribute tubercles from their milk I have no doubt. It appears, then, that milk is an excessively dangerous thing to drink; and, while everything that we can do to get clean milk and normal milk in the beginning is good, yet it seems to me that the heating of milk to a temperature of 160 or 165 degrees is a great deal better. I cannot state too strongly my opinion that the only safe milk to drink is milk that has been at least Pasteurized. That is all, Mr. Chairman.

MR. GAGE.— I would like to ask Professor Sedgwick if I understood him to say he found seven thousand bacteria per cubic centimetre in Pasteurized milk, or was it commercial?

PROFESSOR SEDGWICK.— Commercial: it had been through the hands of several people. It was hardly giving it a fair show.

A MEMBER.— I would like to ask what was found in the laboratory with Pasteurized milk as regards bacteria.

PROFESSOR SEDGWICK.— I do not know what the number in such a case would be; but it is a hundred or two,— something like that or even fewer. I think done in the laboratory, you can get it down to dozens or units; but I mean, done on a large scale by an intelligent man, you can get it down to a hundred or two. It is well known that all germs of typhoid fever or tuberculosis are killed by proper Pasteurization; but there are some forms of bacteria, as there are some human beings, that resist more than usual. It depends very largely on the milk that is Pasteurized. If you go and buy some milk that already has millions of bacteria in it, and a lot of dirt and all that, and Pasteurize that milk, you will undoubtedly have rather a hard time. *Milk ought to be Pasteurized at the latest very soon after it is drawn from the cow, and then it would be much cleaner and better taken care of;* and, when it is treated in that way, it is almost perfect. I should like to second what Dr. Chapin has said. *I really believe the time is coming when it will be regarded as a very unusual and uncivilized thing to drink unpasteurized milk; and I think, if I had brought in some Pasteurized milk and passed it around here, and said nothing about it, nine out of ten of those present would not have known but they were drinking ordinary sweet milk,— that is*

most people, having had no sweet milk in their lives, have got used to a commercially sweet milk, and, when they get hold of sweet milk, they think something is the matter with it. But anybody who has ever squirted milk into his mouth from the teat of a cow, as all boys have done who live in the country, knows that milk that has been Pasteurized tastes like that he used to get when he was a boy,— practically, normal milk. I believe in cities especially we have got to come to that sort of thing; and I believe that, unless we do come to that, we shall see cholera infantum and epidemics of typhoid from milk. I really believe, if we could put Pasteurized milk into Boston to-day, and let nothing else go into the tenement-house districts, the number of cases of cholera infantum we should have would be too trifling to mention.

DR. MILLER.— I would like to ask the professor how high he would have to raise the temperature, in order to be sure he would destroy those germs he spoke of?

PROFESSOR SEDGWICK.— That is a very difficult question to answer, for boiling does not kill all of them in all cases. As a rule, boiling will do it,— boiling for a few minutes only; but there are spores sometimes present which will withstand even considerable boiling, and one would really need to put the milk in a retort and give it superheated steam, or something of that kind, to be perfectly sure he had destroyed the last one of all.

THE PRESIDENT. I hope Dr. Russell may be able to say something to us on this subject.

DR. RUSSELL.— Mr. Chairman, I count it a matter of great good fortune on my part that I am here to hear this discussion. I came down from my home this morning by special appointment to go before the Cattle Commission on this very subject, and I imagine our interview would have been very interesting. I will tell you of an experience I have had, which you probably have all had in your work, but which is new to me.

Two years ago, as the chairman of the Board of Health in my own town, I looked up the matter of the milk supply, and at once stumbled on one of the most wretched condition of things which I

believe could exist in any civilized community. The members of my board were not in sympathy with me, which sometimes happens in local boards of health. So I had to shoulder the whole responsibility and do all the work myself; and in the summer I went with the official inspector of animals, appointed, as you know, by the selectmen, who represent the State Board of Cattle Commissioners. His business was to inspect all the animals in that town,— a visual inspection. Not being an educated man, he could not make a physical examination. He also had to inspect the condition of the barns, the size of the rooms, the water supply, whether hogs were kept in the same barn, etc. The first place I went to or the second we found the man kept his milk in a little room six or eight feet wide, and had a well underneath where the water stood six feet deep, close to which there were half a dozen hogs,— as filthy a place as could be imagined. In this room were harnesses, blankets, bags of phosphate, and other things, besides some old rubber boots.

The next place I went to the man had a new barn, quite clean; but he said he had had to give up the water from a certain well, it had become so bad he could not use it any longer. I said, "You have continued to use that until quite recently?" "Yes, until within a very few days." The water was positively rotten.

The third place was a farmer's barn. When we entered this barn, we were completely upset. The odor was simply horrible, and we spent fifteen or twenty minutes trying to find out what the odor came from. We found three cows in this barn and four or five hogs on the same floor, without any possibility of drainage; and there was something else — we could not find out what it was — that made the most infernal odor I think I ever knew.

The fourth place I went to there were seventeen cows. The place had not been cleaned, the same condition underneath, a damp cellar. There were lots of rotten pumpkins in the same room with the cows, and cobwebs hanging down two feet long, and about everything as unsatisfactory as it could possibly be. I then went to the farmer's own house, and asked him to show me the milk-room. This was as dirty a place as you can imagine. There were piles of food on platters and sour milk in wide-open pans and articles of clothing in this room; and the place where the mother of the family was washing

the pans and cans was the ordinary sink, in which was piled up, I think, the accumulated dishes of at least two or three days, which had not been touched.

I went to another place, after this, and found the same condition so far as the barn was concerned. I went into the house, and asked where they took care of the milk. They said it was a very nice milk-room, where they kept the milk with great care. I asked if I might see it. He hesitated a moment, and consequently I pushed in; and here in this milk-room were particles of food, part of an old ham, a tub of old clothes, and on the top was the monthly wash of the females of the family. That is a fact, gentlemen. It does not seem possible.

After I finished this investigation, I began to correspond with the Board of Cattle Commissioners, and not to my satisfaction, however. I then went to work to see what I could do about the matter. I found that my board would not join with me, but I was determined that some of these animals which I had seen and knew to be diseased should be killed. I had one killed from a herd of six. I was at the *post mortem* myself. That cow was driven in; and, although I have no knowledge of cows, of course, in a practical way, I saw at once it was diseased. Milk had been sold in my village all that summer from that cow. As soon as it was killed and the lungs removed, I made an incision with a knife, and held the lung up like this, and pus ran out of that lung by the spoonful. I had two others killed, and they were found to be riddled with tubercles from head to foot.

Some of these statements I made known, in order that I might wake up public sentiment. One milkman said he had just as lief drink milk from a cow that showed this diseased condition as from any other cows. The tubercles were not found in the milk, therefore the milk was just as good as ever. I woke up a lot of public sentiment on the matter, and then began on the regulation of the milkmen themselves. My board would not aid me, and I thought I would stop for a while; but I very quietly got myself appointed milk inspector,— an unusual position for a man to take that had my work to do, but I was bound to see the thing through. I went to work, and of course was the recipient of all the curses that can be imag-

ined. All the milkmen in the town got after me, and there were not words enough in the dictionary to give a statement of their ideas of my conduct, the money I had, the clothes I wore, and everything else; but I stuck to it, and I refused to give any man a license who did not conform to the regulations.

I might mention here, however, that in that first paper the recommendation of the committee was made that boards of health license the milk inspector. As I understand it, now, in the country towns at least, they cannot do that. The license must be given by the milk inspector. He is appointed by the selectmen. There may be one or more. He then appoints a series of collectors, one or more, subject to the approval of the selectmen. Well, I got myself appointed as inspector, and went to work with one person. I told him what I wanted done and why I wanted it done. We went to a certain barn, and had it thoroughly swept with a coarse broom. That got the cobwebs, lice, etc., out of the way. Then I had the stalls washed with hot water, with one per cent. of corrosive sublimate solution wherever the animals could reach with their tongues, the sides of the stalls, and front of the place in which the animals stood. Then I had the whole whitewashed thoroughly. This was in accordance with a State regulation put out by the Board of Cattle Commissioners, but not insisted on only under circumstances of this nature wherever they find an animal which is diseased with tuberculosis and condemned. Then they will not pay the man for his cow unless he has done this. I went still further, law or no law in this case, and insisted that I would not grant a license to any man who did not put his barn in this condition. Now I have licensed about fifty men in my town; and they have carried out these recommendations very thoroughly indeed, and only two refused to do so. One of these was an elderly man, quite broken, and the other quite eccentric; and these two men positively for the last three months have stood on the street corner three or four hours a day damning me.

Now the issue is between them and me as to these last two licenses, and I may get beaten. I cannot tell how that will be. One of these gentlemen has the dirtiest of barns. It has never been cleaned. The man himself wears a suit of clothes that has not been changed probably for ten years. The second man I mentioned has

the dirtiest barn I ever saw. It has not been cleaned out for twenty years. The hens have their dust piles, in which they shake themselves to get the lice out, in the place where the cows are.

Now, gentlemen, you who have not been through an experience of this kind have no conception of the dirtiness and filthiness of that barn. Last week I cleaned the barn of a poor man in whom I take a great interest, who cannot work, and who has the worst of all afflictions in his family. I went up myself to his barn, and where the cattle stood there were millions of live lice. You could not put your hand on any part of that stable where you could not cover thousands of them. The man that did the work was so disgusted he wanted to give up the job. Said he, "I never thought such a thing could exist"; but by persuasion I got him to finish the work. I tell this, so that others who have not had this experience can look around, and see what they have got in their own towns. I do not think it is possible to have a decent supply of milk unless you have honest and honorable milkmen.

THE PRESIDENT.— I will call upon Dr. Davenport.

DR. DAVENPORT.— The paper which has been read upon this subject has been interesting to me. I have had some little experience for the last fifteen years in the examination of milk, having been milk inspector of the city of Boston and chairman of the Board of Health in one of the suburban towns. The recommendations of the committee are most excellent and very desirable, but I think the gentleman who starts in to carry them out in the city of Boston will have his hands full for some while. I wonder if the committee have any idea what would be the expense of carrying them out. The present appropriation of the city of Boston for milk inspection is some $12,000, I believe; and in regard to the licensing of milkmen I do not think the inspector has any authority to discriminate between whom he shall give a license to. I think the statute, as I remember it, says he shall license whoever apply; but, if he is on the Board of Health, he has ample authority to complain of a milkman as a nuisance. He can cover it in that manner.

In regard to the regulations of the Cattle Commissioners about

using corrosive sublimate upon the walls of barns and then using whitewash, I do not exactly see the object of that contention. One would tend to destroy the effect of the other, and the other is not chemically economical.

DR. RUSSELL.— They require the corrosive sublimate to be washed off before the whitewash is put on.

MR. DAVENPORT.— Many of the recommendations of the committee are such as would have been carried out if we had been able to learn how to do it. There were many practical difficulties.

THE PRESIDENT.— The Association, fortunately, has as its guest this afternoon Mr. Burns, of the Boston Dairy Company; and I hope we may hear something from him.

MR. ROBERT BURNS.— Mr. President and gentlemen, I have thought this subject over, and our company has given it some attention. Last summer we sent what we considered an extremely experienced man to visit our dairies. He was a man whom we thought competent to talk to the farmers, and tell them how they should take care of their milk and everything in that line. This year, some ten weeks ago, we started him out again on a different plan. We wanted him to go to different farms, and inspect the place and make a report; and we furnished him with the means to make a report of the conditions of each dairy. That is, he made a note of the number of cows a certain man kept, the breed as near as he could, and the kind of water, whether well water, running water, or a windmill. Now he has found this year a great improvement over last year. In fact, we have some twelve or fifteen hundred dairies; and he has found that the large majority of these dairies keep their places as cleanly as can be under existing circumstances. Of course, in a good many places the farmers milk their cows, and strain into cans directly behind the cows; but the majority of them do not do that. He has discovered some very crooked places. It seems to me it would be a good thing, if it could be done, to have a law passed, so that the boards of health of the different towns could inspect the farms, and prohibit the sale of milk from those farms, if the conditions were not satisfactory.

Now one particular case. This man, going to a certain town, before he got to this farm, people said to him, "I wonder what you are going to do when you get to so and so's place?" Well, when he got there, he found,— what? This man's barn was filled with apples from last fall. Of course, they had all rotted; and the juice was running all over the floor. The cows were being fed on those apples. Of course, such cases are exceptional. We find very few of them in that condition. Of course there can be improvements; and it seems best, as I say, that a law should be passed, so that inspection by the boards of health may do a great deal of good. We have a law, you know, on the statute books concerning brewers, dealers, and contractors; but that is inoperative, and does not amount to anything. If a law could be passed that gave power to the board of health to prohibit these things, then I think the trouble would be minimized to a certain extent.

Now as to sour milk. Professor Sedgwick says this has been a very good season. It has been a majority of months; but, as a matter of fact, during this hot spell there was more sour milk in Boston proportionally than was ever know before. Perhaps the idea was given to you that the milk soured on board the cars coming to Boston, but, as a matter of fact, probably ninety per cent. of that milk was sour before it was ever set on board the cars; but the time of receiving it is so limited that it has to be put on board the cars, and brought to Boston. I know one of our men who tasted three hundred cans of milk to get one hundred, during this hot spell. That milk came from Connecticut Valley, as fine a farming neighborhood as there is in New England; and the milk of one of these particular dairies was soured every day. That particular farm probably is as fine a place as there is in New England. The cows are a fine breed of Jerseys. The conditions are as perfect as under the present system they can be. The man has ice, nice water, everything as clean as possible; but there was not a day that that milk came to Boston it was not sour when it was set on board the cars. We sent our inspector to this place immediately. The farmer's wife said that she did hope her husband would find some other place to dispose of his milk instead of sending it to the milk car. The milk was found to be sweet at the farm, but sour when it reached the car in the morning.

Now, personally, I do not think that it is much trouble tasting sour milk. The worst trouble we have is with what we call rotten milk. Its taste or smell, too, is simply awful. A man can taste sour milk all day, it won't affect him at all; but just one whiff of that milk would affect the whole business. Now that kind of milk, as far as sweetness is concerned, is perfectly sweet, and probably would keep. I do not know any reason why it should not keep as long as milk that has no odor whatever. Now, of course, the argument here is to do away the conditions that generate bacteria. Of course, farmers set their milk in troughs to cool, and leave their bungs out. I do not see any way now to take care of milk under those conditions without leaving the bungs out. As a matter of fact, milk will not taste properly if it is stoppled up before cooled; and, if it is left open, of course bacteria will generate in there right straight along, and you cannot help it; but that is the way milk has to be put up to come into Boston properly.

Now the samples that Professor Sedgwick has compared may not be samples of the very best dairies. I cannot say. I gave him one sample of a very fine dairy, I know; and I doubt if he has got samples of the very best dairies. We have customers that have practically never returned us a can of sour milk. This year I know one has not returned us a can of sour milk: that milk is put up properly; but there are other dairies where we have had to run two extra carloads of milk to make up for their sour milk.

The report of the committee said something about washing cans and sending them back to the farmers. Well, we have been all through that; and I think we got conditions that proved that that, from a health point of view, was the worst possible thing that could be done,— not only upon health, but from a financial point of view. The financial part of it is that milk has a preservative effect upon the can. A can will last for years simply with milk in it, whereas with water in it it will rust out in a few months. We have always considered that. In fact, we would not buy of farmers or dealers of that description, who rinse their cans in cold water and return them to us. They may stand a day or two a certain amount of water left in there, but that is going to rust the cans. That is a good deal worse than sour milk, to our minds.

Now, as for washing the cans clean and sending them back to the farmer, of course, perhaps the majority of the gentlemen present would take these cans as they came back clean, wash them out thoroughly, and let them air out; but I am very much afraid the large majority of farmers would never stop for that or never would rinse those cans out before they put milk in them, and cans in that condition, stoppled up in the hot season, present what is perhaps the worst condition possible.

Now as to sterilizing the cans with steam. I do not know just exactly what you mean by that,— whether you wash the cans first and then sterilize them or wash them and boil them right out with steam. But I can give you a few facts on that subject. We in our factory have a large pump, fitted up with a four to six inch pipe, which is used for raising milk from the lower story to a higher one. We commenced by cleaning the pump with boiling hot water. After a short while we found there was a very offensive odor coming from them, and we discovered that the sour milk would cake on the inner lining of the pipe and inside the pump; and that, of course, was the source of the odor. Now we have built a tank, and we pump cold water through the pipes, then rinse them through with a solution of sal-soda and boiling hot water; and we find there everything is clean and sweet as far as smell is concerned, and as far as we know, of course, it is all right. We use up our surplus milk by making cheese of it after it goes through the pump.

The worst trouble is sour milk. There is no doubt about that. The ordinary milk supply of Boston, the ordinary amount that is brought in, would be perfectly sufficient to supply Boston if there was no sour milk. There is no possible need of a single can of sour milk coming into the city of Boston, if proper care is taken. We have an extra car come to Boston in a hot period from our cheese factories in Vermont, and there is practically no sour milk; and, if one can do it, there is no reason why others cannot do it. Of course, farmers say they are short of cans, and have to wash them and fill them immediately with milk. That is true; but that is a condition that no contractor ever solved yet, and certainly cannot solve with the ordinary can used to-day. Possibly, if a forty-quart jug was used, we could solve that question; but contractors all know

that something ought to be done, and are willing to co-operate with the authorities whenever occasion requires, but it involves an enormous expense.

THE PRESIDENT.— Mr. Jordan, of Boston, has had a very useful experience in this matter. Possibly he will say something to us on the subject.

MR. JORDAN.— Mr. Chairman and gentlemen, I do not know that I can add anything to what has been said. I was very glad to hear the report of the committee to-day, that they had not suggested the adoption of any rules. I think that is a good idea, because I think this subject will bear a good deal more discussion before any rules are adopted. I think we can afford to wait, and that it will be a good idea to adopt the report of the committee merely as a progressive report, and refer the matter back to the same committee to see if they cannot add something more to their report at the next meeting.

As far as large dairies in Boston are concerned, for the last two or three years I have had occasion to visit them very frequently; and I can say that the majority of those dairies have been very good in adopting any suggestion the board made to them, and trying to do everything they possibly can. There has almost been a complete revolution in such dairies in the last three or four years. I have in mind now a dairy which is undergoing a complete revolution in the manner of conducting business. And, in regard to Professor Sedgwick's remarks about the grocery stores down at the North End, I think that it is a very good idea of his in making that report, and making those inspections in those places. That is a condition of affairs which we are very frequently called upon to interfere with. Down in the crowded part of the city they do not have any idea at all what the conditions should be. We very frequently have to inspect those places, and call them to account for the manner in which they carry on their milk business. Very seldom we find the cans washed at all. They are left around the floor in a filthy condition, and very frequently we have called their attention to the condition. At the present time, but more especially this year, the board has closed up quite a number of cow stables in Boston, the conditions

not being at all fit to carry on the milk business. There have been quite a number of places closed entirely. In other cases the owners have agreed to written conditions, to make certain changes before going on trial again in the fall. I think, if this discussion is carried on further, extended to the next meeting, it will prove to be of great benefit.

THE PRESIDENT.— Hasn't Cambridge something to add to this discussion, Dr. Farnham?

DR. EDWIN FARNHAM.— Mr. President, Cambridge last fall had an outbreak of typhoid fever that was due to the polluted milk supply of one milkman. The Cambridge Board of Health thought they would send around some inquiries to the different towns from which milk was obtained, to see if they could find out what the conditions were of the farms, or their barns, and other places where the cows and milk were kept,— not with the idea that they could do anything themselves, but possibly to help along by finding out just what these conditions were. The large milk companies and contractors very willingly supplied me with the names of the places from which they obtained their supply; and the board then sent round this circular, which I will read to the Association. This was Feb. 2, 1897.

CITY OF CAMBRIDGE, OFFICE OF THE BOARD OF HEALTH.
CITY HALL, Feb. 2, 1897.

TO THE BOARD OF HEALTH:

We have adopted and are enforcing in Cambridge certain regulations regarding cow stables, a copy of which regulations is for your information herewith enclosed.

The object of these regulations is to insure that the cows from which the milk supply of our city is in part derived are kept under wholesome and sanitary conditions.

We are desirous of ascertaining how far this is the case with those cows not kept within the city of Cambridge whose milk is, however, brought for sale therein; and we ask that you will kindly aid us in this investigation by furnishing us with the information respecting the farm of ——— in your town which is sought by the questions printed on the next sheet, that farm being one of those from which milk is brought for sale in this city, and, if your investigation of this farm discloses conditions which should be changed, we ask your assistance in bringing about an improved state of affairs.

Believing that through the co-operation of local boards of health much sickness, of which milk may easily become the vehicle of transmission, may be prevented, and thanking you for such aid as you can afford us in this matter, we are, Very truly yours,

E. Edwin Spencer,
Edmund M. Parker,
Charles Harris,
Board of Health of the City of Cambridge.

To the Board of Health, City of Cambridge:

In response to your circular letter of Feb. 2, 1897, we send the following information respecting the farm of ——— on ——— Street in this town: —

1. How is the privy vault constructed? *Answer:*
2. How far is the privy vault from the well? *Answer:*
3. Is the drainage of the ground from the privy vault toward the well or away from it? *Answer:*
4. How is the well constructed? (If no well, state how water is supplied.) *Answer:*
5. Is the well protected from surface pollution? and, if yes, how? *Answer:*
6. How many cows are kept in the cow stable or barn? *Answer:*
7. What other animals are kept therein with the cows? *Answer:*
8. What is the cubic contents of that part of the stable or barn where the cows are kept? *Answer:*

   Is there a privy in this stable or barn? *Answer:*
9. How is the cow stable or barn drained? *Answer:*

   How ventilated? *Answer:*

   How lighted? *Answer:*
10. What is the condition of the cow stable or barn respecting cleanliness? *Answer:*
11. Have the cows been tested with tuberculin? and, if not, what veterinary examination has been made of them, and when? *Answer:*
12. What changes, if any, should be made in the premises to put them in wholesome and sanitary condition? *Answer:*
13. Is the foregoing information furnished from personal inspection of the premises by some member of the Board of Health? If not, by whom is information furnished, and from what inspection? *Answer:*

(Signed) ——— *of the Board of Health of* ———.

I sent one of these to nearly every town in the State of Massachusetts where I knew that milk was obtained which came to Cambridge for sale. Of course, the answers were of various descriptions. Nearly every one answered: there were very few exceptions. One

man said "it would be too much trouble: we have just been all over it with the Cattle Commissioners"; and he sent me their blank, which, I must say, did not give us the information we wanted. Another man wanted to know how much we would pay him for doing it. Still, a large number of answers were received. I have selected a few showing what I thought the needs were.

The chief ones seemed to be these. In the first place, very few barns have any drainage, as far as I could make out from the replies. They seemed to let urine and everything else soak into the cellar. That is almost the universal condition to-day,— to let it run down and soak away somewhere in the ground. The privy vault in a very large number of cases was quite close to the well.

In a number of cases it was simply a hole in the ground, and in some few cases there appeared to be no privy vault at all. I do not know what occurred there. The well in a certain number of cases needed to be protected more than it was; that is, there was no protection at all. It was level with the ground, quite near in a large number of cases to a manure pile. In some cases there was no ventilation: in other cases it was manifestly inadequate. The air space, to which one question referred, was quite often deficient. The stable barn was built probably for a certain number of cows, and the person who built it may have had some idea of how much air was needed; but many more cows had been put in than was at first intended. As to cleanliness, of course, I had to take the report just as it came to me from the persons who made it, not knowing what their idea of cleanliness was: that is a very variable factor; but quite a number mentioned that the stables might possibly be improved if they were kept a little cleaner.

I have not sent any outside the State. It was quite an expense getting these printed, and the board simply went into this for a feeler to see what could be done; but it showed, I think, pretty conclusively this,— that a great deal needed to be done. I do not know why the local board of health should not be able to regulate these various things. We drew up a list of regulations, compliance with which is required by the Cambridge Board of Health before it licenses keeping cows in the city. I will read these regulations.

REGULATIONS REGARDING COW STABLES.

1. Every building used as a stable for cows shall contain at least one thousand cubic feet of air space for each animal kept therein.

2. The lighting and ventilation, and the condition of the roof and floor, shall be satisfactory to the Board of Health, and shall be so maintained. There shall be a sufficient supply of pure water, and such other means for maintaining the health of the animals in said stable as the Board of Health may deem necessary.

3. The stable shall be drained in a manner satisfactory to this board, and, wherever practicable, shall be connected with the public sewer by a good and sufficient particular drain.

4. The manure shall be kept in a pit constructed of brick laid in cement, with a concrete floor at least three inches thick, and ventilated as required by the Board of Health; and no more than one cord of manure shall be allowed to accumulate.

5. The animals shall be examined by a veterinarian approved by the Board of Health, whenever directed by the board.

6. The premises shall at all times be kept in a condition satisfactory to the Board of Health.

The foregoing is a true copy from the records of the Board of Health of the regulations adopted at the meeting of said board, held the twenty-sixth day of October, in the year eighteen hundred and ninety-four.

Attest: JAMES B. SOPER,

Clerk of Board of Health of the City of Cambridge.

CAMBRIDGE, Nov. 3, 1894.

We have had no trouble so far in enforcing these regulations, and I think the cow stables in Cambridge have improved very markedly.

If the city of Cambridge can make those regulations and enforce them, I presume any other city or town in the State of Massachusetts can do the same thing and protect its own interests.

THE PRESIDENT.— Dr. Durgin, shall we hear from you?

DR. SAMUEL H. DURGIN.— It seems to me the report of the committee has given us a great deal of light on this subject, and will be of the greatest use hereafter in formulating rules and in making regulations to control our milk supply. There is one part of this report which refers to sterilization which seems to me of very great importance; and while we are not yet ready to deal with the farmer until these regulations shall have been formed, and while we cannot

prevent the milk reaching us in this poor state, there is one thing which we might advise the people to do, and that is by sending out little circulars to mothers, who may fairly well sterilize this milk before using it, especially for babies. The Boston Board of Health has issued a little circular of this sort, in which it tells the mother how she may sterilize the milk by placing it in bottles and boiling it for twenty minutes, giving specifically what may be done. It seems to me that this has some value immediately to families.

DR. J. A. GAGE.— Mr. President, in reply to what Dr. Durgin has just said I will say this: That, when I have had to answer the question that a mother has asked me, what she could do to be sure that her child was getting proper milk, I formerly advised her to boil the milk, as he has suggested, and sterilize it. But it has been my observation, and I find others have made a similar observation, that children do not always thrive well on milk that has been heated to a high temperature, 212° F.; and Pasteurized milk, I find, is not always easily obtained by uneducated people. One of my professional brethren asked me to advise him in regard to a baby he had. He had lost two children. I urged upon him to be very careful and Pasteurize the milk, went into details with him. It was some time before his wife could be persuaded to carry out all the details of Pasteurization, but, once she had learned the method, she was satisfied; but that was an intelligent family, whereas among the poorer classes it is very difficult to obtain those results. I do not like milk which has been heated to a high temperature.

Formerly I was a member of the Board of Health of Lowell. We got our milk very largely from farms immediately surrounding the city. Some of them were in New Hampshire. There is no inspection of those farms, and I know that recently a great many of them are in a very poor condition. There has been some tuberculosis with us, as the slaughter at Dracut has testified. That town supplied milk to the city of Lowell, and I know from my own personal observation and experience it is a very fruitful source of danger to us there. A recent case may illustrate. A man, who had been out of work on account of illness, thought before he went back to his regular work he would go out on a farm and get strong. I had had the man

under observation some time, and there was no indication of tuberculosis; but after being on the farm awhile, and drinking two or three quarts of milk a day, he came home, and I found tuberculosis. The cow was killed. The man who lives on that farm is a fairly intelligent farmer; and, if he knew positively, and was convinced that he was feeding his family on tuberculous milk, he would not do it. I do not think he is convinced thoroughly.

This case bears upon one point I wanted to make with reference to the whole question of milk supply. I do not know that there is anything in the report in relation to giving these milk producers information. I knew one place where a man was starting in the milk business, and the first thing he did was to start a well in the barn yard. That was due to ignorance. I certainly feel we ought to have some inspection. I myself am afraid to drink milk without knowing the source from which it comes; and, when I go among my poor families, I hardly know how to tell them to Pasteurize their milk, feeling sure they will get the best results. We want to get the source pure, and as fresh as we can, and get it as soon as we can from the supply into the hands of the consumer; and it seems to me, while restrictive laws are very necessary, and I thoroughly agree with the suggestions of the committee, that something might be done tentatively in the way of education, certain suggestions as to measures that they could take without great expense, which, I think, would help the matter.

DR. MILLER.— It seems to me something might be done in this direction. I think the majority of milk producers would like to do just about the best thing if they knew what to do. Certainly, they would if it was made clear to them that it would be a financial benefit. Now it seems to me, if the State Board of Health, or some authority would send a circular free to anybody in the State that produces milk, giving them directions how to care for their cows and cans and the like of that, that we might in this way educate farmers and milk producers, so that they would give us a better quality of milk; and these gentlemen who deal in Boston, to a very large extent, could give their milk producers to understand that their milk would be more likely to be received if they conformed to certain

rules. Now I have paid some little attention to this subject, and I am inclined to think that the fault is due to the kind of can in which the milk is conveyed from the producer to the dealer in the city. I have tried this experiment, taking milk from some milkman and letting him bring it to the house in his can, and then furnishing a can of my own and telling him to fill that can instead of leaving it in his; and I find that milk would keep a great deal better, when I furnished the can, than it would if the milkman brought it in his own can. I always cleanse the can with boiling water thoroughly, and then I find the milk will keep a great deal better. I am inclined to think the great fault is in the condition of the can in which the milk is conveyed; and I think, if the proper information could be given to the dealers in the Connecticut Valley, so that they would see their milk would be more likely to be received if the farmers could be educated on that subject, they would do better, because you can touch every farmer through his pocket, surely. And, if you can make him believe his milk will have a larger sale and will bring him a better price if he will do so and so, he will be more likely to do it. And say to these dealers, "We will give you something more for your milk if you do so and so: we will pay you more for your milk." I think in that way the farmers might be educated, through their heads and pockets, so that we can get a better quality of milk.

MR. BURNS.— In regard to this circular business, telling the farmers how to care for their milk, I will say we sent our man right there to inspect everything. He has gone right into the kitchen, and inspected everything on the premises, and told them how to do it; and, if that is not telling them how to do it, I do not know how we can do any better. We ought to have a law that we could make some complaint to the local board of health that we do not think the conditions are right in a certain place, and then it could send an inspector there without bringing us into it, and tell them the place was not right. Inspect it again; and, if they do not attend to it, take them into court, and prohibit their selling milk. I think that would be a great improvement. In some places, in the city of Boston, people put rotten eggs and cheese and things of that kind in cans. Where a man has a customer taking two hundred cans a day, he cannot say, "You

must stop putting that stuff into my cans." We ought to have authority in the city of Boston to send an inspector to such places, and prohibit it; and, if it is not stopped then, bring the man into court. Then I think cans would be in better condition than they are now. The bad condition is due to rotten eggs, molasses, and that kind of things being put in the cans. We ought to be able to prevent that.

There is another matter I will speak of; that is, this cheap selling of milk in the North End,— selling for four cents a quart. In fact, that was rather a high price. I think milk was sold there for two cents a quart. As near as we could find out, the method was this: In the morning they would sell milk of good standard quality; and, when the collector of samples came round to these stores, they would get that milk. The minute they went out they would take skim milk, and sell to these ignorant people. It cannot be sold to a nice family; but it is sold to these ignorant people. I am happy to say that they do come into court, and pay a fine sometimes.

DR. MILLER.— I did not intend to find any fault with the dealer. I would have this circular issued by the State Board of Health, or some authority backed up by the power of the State; and then it perhaps might be made easier for some member of local boards in each town, so appointed, to look into the matter. If he was backed up by the State, it would be universal over the whole State.

MR. BURR.— Mr. President, I have been much interested in Dr. Farnham's remarks in regard to the condition of the farms in New England from which his milk comes; that is, of the farms from which he obtains milk. It seems to me it would be a good plan in this State if every board of health could have a record of each farm from which milk comes, whether it is in the State or out of the State. In that way we might have registered farms; and we might make regulations that these barns should conform to, and refuse to grant permits unless the barns did conform to the regulations. For instance, I think the storing manure in the barn cellar has come to be quite an objectionable feature; and the method of handling milk, after it has been drawn from the cow, needs attention. Now in a

good many farms the milk is handled directly in the same barn. It seems to me that is quite an objectionable feature, and, as the committee reported, that milk ought to be handled outside of the barn, and also outside of the dwelling-house, and also that the milk-cans, if washed upon the farm, should not be washed in the kitchen of the house. So much for that.

Now I am a little interested in the method of the transportation of milk. I do not know whether that has been touched on or not. It seems to me that the milk supply has got to be improved from all points, not only its production, but its transportation and handling also. The Board of Health of Boston sent out a few questions to the different dairies or contractors in the city of Boston, delivering milk in the city of Boston; and among them were questions asking the maximum time that it took the cars to come from the country milk-station, the minimum time and the average time. I do not think, with but one exception, the maximum time was given over three and one-half hours. Now I know we have some milk contractors here to-day who perhaps can correct me in what I say. I was interested the other day in a reply that came from a farmer in New Hampshire, in which he reported the route of a certain car. That car left Claremont (I will give the towns: perhaps I may be corrected in it), we will say, on Monday morning, containing Sunday night's and Monday morning's milk. It went through Claremont to Bradford, arrived there some time Tuesday morning, and took on Monday night's milk and Tuesday morning's milk. It went from Bradford to Hillsboro, N.H., and arrived some time during Wednesday, and took on Tuesday night's milk and Wednesday morning's milk, arriving in Boston on Wednesday about ten o'clock. Now that car contained Sunday night's milk, Monday morning's, Tuesday's and Wednesday morning's milk. It seems to me that is quite a serious condition; and, if that is the case, certainly the transportation should be improved. While that car was iced, as all cars are, considerable milk is stored on the floor of the car; or I might say, further, that milk which arrived here, we will say, on Monday or Tuesday, was put into the closet for these cars, which are probably iced; and, as the milk came on later, it was stored on the floors and about the doors. The ice stays in among the mass; and, as the cans come along, different layers

were made. So a great deal of that milk, it seems to me, was not probably iced. I have no great doubt but all those cans put in the closet were properly iced. It seems to me that transportation could be considerably improved, as well as all other sides of the question.

MR. DAVENPORT.— Mr. Chairman, the improvement of the milk supply of the city of Boston, when it comes to the hands of the consumer, has shown the advantage of having the appointment of the milk inspector under the charge of the board of health, as it has now come to be in the city of Boston. It is also so in the case of the city of Lynn, but I think those are the only two cities in the State where the inspector is appointed by the local board of health. In the case of Cambridge he is, I think, appointed by the mayor; but the inspector, as a health officer, ought to be really under the appointment of the board of health. An attempt some years ago was made to accomplish that for the State at large, but it was defeated. It would be a great improvement, and I think, if this Association should make a concerted effort, it could be brought about; for, certainly, it should be considered as a health matter, and not, as it generally is, an appointment made simply for political purposes.

DR. FARNHAM.— I would say the list of regulations drawn up by the city of Cambridge required cow stables to be kept in a condition satisfactory to the Cambridge Board of Health. There was one dealer in Cambridge last year who kept his cow stable in a very unsatisfactory condition. I wrote to him about the matter several times without effect; and, when he applied for a license this year, he was given leave to withdraw. He applied successively for three weeks, and each time was given leave to withdraw. He was then prosecuted for keeping cows without a license obtained from the Board of Health. That case is now in court. When it is decided, we shall know just what we are able to do with cow stables in Cambridge.

THE PRESIDENT.— It seems to me there is a sufficiently contented expression on the faces of gentlemen here,— an expression which certainly ought to be there. It is that expression which

shows the successful digestion of an exceedingly good dinner, and I am therefore going to introduce another subject, which should be in harmony with such an occasion; and that is reminding you that Dr. Field is anxious to take a dollar and a half, the annual assessment, out of every member here who has not already paid it. Mr. Gove, have you anything to add in closing this discussion?

MR. GOVE.— I think, Mr. Chairman, instead of my saying anything at the present time, it will be much better to have the discussion closed by Professor Sedgwick.

PROFESSOR SEDGWICK.— Mr. Chairman and gentlemen, I think there has been a very full discussion. I have been particularly gratified to see the breadth of the discussion. It won't do to narrow the question of polluted milk down to a question of tuberculine or anything of that kind. It is the whole question of getting more normal milk in the city; that is, the question of cleanliness in the barn, cleanliness on the part of the milkmen, cleanliness and rapidity of transportation, and care of the milk after it arrives. It seems to me those various points have been touched upon, and a good deal of valuable matter has been elicited. The only way to bring about improvement in this matter is the old one of keeping everlastingly at it; and it is very encouraging to have these statements that some of the inspectors have made, that there has been a very decided improvement. For instance, in the speed of transportation I think the idea of education is a very important one. I think that wherever the farmer is given to understand what it means to have sour milk, why it is a bad thing to squirt milk on his hands when he sits down to milk and lets the drippings run into the pail, why it is a good thing to wash the hands, and that it is a good thing to wash the hands even before sitting down to milk,— if a campaign of education in that direction can be had, the better it will be for the whole city. Personally, I feel very much gratified at the interest that has been expressed, and I believe we have now reached this conclusion: first, that at present the milk supply is not satisfactory; second, that it can be made much better; third, that, in order that it shall be made much better, the farmer must be

informed, and, if the necessary pressure is to be brought to bear upon him, the milkmen themselves must be informed, and led to deliver the milk as rapidly and as fresh as possible; fourth, when the consumer demands a cleaner and better article, when he objects to dust in his milk, when he objects to a black sediment in a glass of milk, then we shall get a better supply.

I have been particularly gratified with the breadth of the discussion, because it seems to me that is exactly what the whole thing needs. If the Association sees fit to recommit the subject to the committee or to require further elaboration of this matter, that would be well worth it, only I think we should be in no great haste about it. We do not want to wear the Association out in talking about milk; but, for instance, if at the meeting after the next one there should be a further report, it might be well, and I think the committee would very cheerfully undertake to do what they can, and be very specific, and state that a cow should have just so many cubic feet of air, although that is not the most important thing. The first things to be understood are the principles underlying the milk supply. The danger is to-day that the public will get so frightened about milk that they won't drink it at all, and it is better they should not unless it is improved. I never do drink a glass of raw milk; but, as soon as the public become sure that there is care on the part of the farmer and milkman to be clean, and the milk-cans are all clean, we shall get ahead. I do not know that I can personally agree with the idea that it is best to let these cans go back with the drippings of milk in them after standing round in that hot store that has been mentioned. It seems to me it leads the farmer into dirty habits, because he has got his can home in a very unsatisfactory condition; and he might say, "The people in the city don't take any pains to clean the cans," and then he will be apt to take no pains. It is a new point to me, and so in regard to other points I am sure the Committee have learned a great deal; and I only hope the Association has learned something from the committee.

Dr. Durgin.— I move, Mr. Chairman, that the report of the committee be recommitted with instructions to further consider the

matter, and report such rules as can be adopted by the boards of the State and put into practice. I think a report in October would be far better than a report in January, if it could be completed, on account of the possibility of further legislation being needed for getting the best effect of the regulations. In January it would be rather late for any new legislation for the present year; but that matter might be left with the committee if it is able to report in October.

(The motion was seconded and adopted.)

A MEMBER.— I would like to suggest that Mr. Burns or Professor Sedgwick take particular notice of the treatment of cans and of transportation,— the treatment of cans before they are sent back from the consumer,— that that might be embodied in the next report.

THE PRESIDENT.— It is understood the committee will consider the various topics which have been introduced at this meeting.

The meeting was then adjourned.

PUBLISHERS' DEPARTMENT AND BOOK NOTES.

In this department the publishers will include notices of such subjects, germane to the scope of the *Journal*, which would seem to be of interest to its readers, but which are not a part of the transactions of the Association.

THE UTILIZATION OF BY-PRODUCTS IN DAIRIES.

The Food Fair, which is held during the month of October in Boston, contains in its Agricultural Department an exhibit of unique character, which has for its object the demonstration of certain new processes for utilizing the by-products in dairies; namely, the skimmed milk, the buttermilk, and the whey. The exhibit is made by the Dairy Improvement Company; and the processes shown have been devised by Mr. Alexander Bernstein of Berlin, Germany, at present in Boston.

If we consider the enormous quantities of these by-products,— probably more than twenty million quarts per day,— the question of their better commercial utilization appears of the utmost importance as a matter of national economy; but it will also be seen that these new processes are of equal interest to sanitary science, and even touch a social problem.

Commencing with skimmed milk, it seems at first sight rather unreasonable that such milk — which, according to analysis, has still a considerable food value — should be so much lower in price than milk not deprived of its fat. But the fact is that the deficiency in fat not only decreases the food value to a small extent, but materially alters the conditions of the milk itself. When the milk is drunk, and the casein coagulates in the stomach, the interposition of the innumerable microscopic fat globules — and the fat only exists in this form in milk — prevents the curd from forming a compact mass, and the digestive juices readily find access to the particles of casein. The removal of the fat, however, allows the casein to coagulate into a solid substance, which is difficult of digestion. The results are the same in the case of cheese, made out of unskimmed and of skimmed milk.

In order now to obtain a digestible cheese from skimmed milk, Mr. Bernstein proceeds as follows: —

The milk is mixed with a small amount of wheat flour or other farinaceous material. The flour does not dissolve in milk, but can be maintained for a short time in a state of exceedingly fine division, approaching the state of the fat globules. If rennet is added, and certain precautions are taken, the milk will gradually curdle and retain the flour in an even and very finely distributed state in the curd.

The further treatment is as usual; but the cheese, instead of being a hard, leathery substance, is soft and of loose texture. It seems that during the process of ripening the flour undergoes some changes, which impart a pleasant piquant taste to this kind of cheese.

But the utility of this process has another application. This farinaceous curd — as it may be called — can be made so loose as to form a powder when dry; and it can then be mixed with more flour to form a dough suitable for baking purposes. Baking products of this kind are exhibited, which contain the protein matter and carbohydrates in about the proper proportions to sustain life. The protein substance in such a finely divided state is very easily digested and may prove valuable in many cases in which meat is not desirable. Apart from this, the economic value of such products as a general food is very considerable.

In these processes, skimmed milk and buttermilk may be mixed together.

After the casein has been removed, the whey remains. In another part of the exhibit is shown how this substance can be made into a pleasant beverage, of excellent taste and wholesome.

To accomplish this, the whey is treated in such a manner as to become perfectly clear and transparent by the removal of all undissolved matter. The popular idea that a beverage should be clear is not a mere fancy. In drinking, we wish to assist digestion and not introduce undissolved substances, which give additional work to the digestive organs.

The finished whey, to which the name of "Wheyn" has been given, contains a considerable amount of lactic acid and a small amount of sugar, which is added to make it more palatable.

As to its medicinal effects, it has long been known that whey is an excellent tonic in cases of general debility, in liver and in kidney diseases; but the fresh whey is out of reach for the city population, and the danger of possible infectious germs is another objection to its use.

In wheyn, we have a perfectly sterilized product, pleasant to the taste, which has all the essential features of whey as a beverage.

It would be difficult to state whence the medical value of whey is derived. It is a remarkable fact, that animals fed exclusively with an artificial mixture of pure casein with sugar and the salts of the milk, all in proportion in which they are contained in milk, will invariably die within a short time, showing that there must be something in the constitution of milk which is not shown by analysis.

Wheyn has been made sparkling to answer the purpose of a table beverage, and in this form it is shown in the exhibit of the Dairy Improvement Company. It does not contain any alcohol or

any substitute for it, which is often mixed in the so-called temperance beverage; but it is claimed that it has the pleasing effect of an alcoholic beverage. If this is the case, the temperance party should find in it a quiet but eloquent assistant of great convincing power. It certainly ought to be a most wholesome drink.

MODIFIED MILK FOR INFANT FEEDING.

Modern scientific writers, of all schools in medicine and in all civilized countries, unite in affirming that milk should be the sole food for the baby. Those specialists whose writings are regarded as most authoritative further insist that nothing not native to milk shall be given to an infant during at least the first ten months of life. Nature, they say, has spoken the final word on this subject through the tables of infant mortality; namely, that milk alone is the baby's proper food, breast-milk if plentiful and good, but, failing this, the milk of some animal modified to conform in all particulars to the natural model. Practically, the cow has, for obvious reasons, been chosen as the foster-mother of the human race.

In short, some modification of cow's milk is the only proper substitute for the milk of a healthy and suitable human mother.

A complete study of the model given by nature and of the copy provided by art reveals the following great facts regarding the whole subject of substitute feeding.

That, as nature provides variety, and not uniformity, in the milk of the breast, therefore successful substitute feeding largely depends upon the provision of a modified milk exactly suited to the digestion and assimilation of the especial individual infant, and that no routine mixtures can be employed,— in other words, that there should be provided for every baby its own special milk.

Perfection in feeding requires great accuracy in the modification of the milk employed, as slight differences in the relation of the percentages of the milk constituents often determine the success or failure of the feeding.

It is indispensable that the milk employed shall be pure, fresh, and safe, derived from healthy animals, carefully produced, and hygienically handled.

These are the requirements imperatively demanded by modern medical science in the feeding of infants. How can they be met?

It is a matter of common notoriety that the milk of commerce does not meet the requirements of scientific feeding. It is neither pure, fresh, nor safe. Nor can sterilization or pasteurization replace those aseptic precautions which should surround the production of milk intended for infant feeding. Sterilization cannot make a stale milk fresh nor a diseased milk nutritious.

Further, it is certain that the so-called "Home Modification" of milk is unsafe and unscientific, both because the milk constituents of the milk usually employed are unknown, and because this milk always contains more or less harmful bacteria.

In like manner, also, the widely advertised "perfect substitutes" for mothers' milk are all defective in a fatal way; namely, that they presuppose a knowledge of the milk constituents of the basis of the food, which is unobtainable.

In short, the successful feeding of a healthy infant and the treatment of a sick one demand *Modified Milk.*

Substitute feeding by "Modified Milk" requires

First. Knowledge on the part of the physician of the case as an individual, so that a milk may be employed exactly suited to the especial infant.

Second. Knowledge, both by the physician and by the modifier, of the chemical, physical, and bacteriological characteristics of both breast-milk, which is the model, and of modified milk, which is the copy.

Third. Accuracy on the part of the modifier in the putting up of the prescription sent in by the physician.

Fourth. A safe, pure, fresh, and stable milk to be used as the basis of modification.

These requirements are all practically met at the Walker-Gordon Laboratories.

Infant feeding in the practice of pediatrists is now scientific in theory, and, where the Walker-Gordon Laboratories are employed, is also scientific in practice.

To quote the language of one of the greatest authorities upon this subject, "The establishment of these laboratories has marked a new era in preventive medicine, and has made possible the scientific feeding onfants."

The Walker-Gordon Laboratories were founded and are employed for the use of physicians in the scientific feeding of infants and invalids.

These establishments dispense "Modified Milk" upon physicians' prescriptions only, and sell a whole milk that is safe for nursery use.

They are known as "the physicians' right hand in feeding."

PES PLANUS.

There are few abnormal conditions more common and less often recognized than "pes planus," or flat-foot. The symptoms simulate so closely rheumatism in all of its forms that it is more often diagnosed as this condition than what it really is. The pain may be between the third and fourth toes, across the instep, in the

upper part of the calf, and even at the source of the sciatic nerve. Sometimes there is swelling that may extend to the knee. Often the condition is called rheumatic gout, from the amount of inflammation and tumefaction around the ankle joint. The diagnosis, however, between the results of flat feet and rheumatism should not give the physician trouble if he will remember that rheumatism feels better after exercise, while flat feet feel worse. In all cases that do not yield readily to a rheumatic treatment, it is always wise for the physician to examine the foot carefully; and, if he finds a tendency, although slight, to the breaking down of the arch, he should employ a suitable support, and in a very great proportion of cases he will obtain relief. There are many kinds of supports used to overcome this condition. The old style metal plates, however, are going out of use, both on account of their weight and clumsiness and also from the fact that it is necessary to take a plaster cast of the foot. A great improvement over these, and undoubtedly the best article now manufactured for this purpose, is the so-called "Improved Arch Supporter." These consist of three steel springs encased in leather. They require no plaster cast, as they are fitted directly to the foot, and have a normal arch. They are also much easier to the foot than the old style metal supporters. The price is much less to the patient, as no plaster cast has to be taken.

BOOK NOTES.

Another new book is to be added to the rapidly increasing literature on pediatrics, a volume entitled "About Children" being announced by the Medical Gazette Publishing Company of Cleveland. The author is Dr. Samuel W. Kelley, Professor of Diseases of Children in the Cleveland College of Physicians and Surgeons.

A valuable volume just published by Messrs. William Wood & Co. is the "Atlas and Essentials of Bacteriology," by Prof. K. B. Lehmann, Chief of the Hygienic Institute in Würzburg, and Dr. Rudolph Neumann, Assistant in the Hygienic Institute in Würzburg. It is finely illustrated with 63 chromo-lithographic plates, comprising 558 figures and numerous engravings.

The course of lectures on Pharmacology and Therapeutics delivered at St. Bartholomew's Hospital during the summer session of 1896, by T. Lauder Brunton, M.D., D.Sc. (Edin.), LL.D. (Hon.) (Aberd.), F.R.S., who is fellow of the Royal College of Physicians, Associate Fellow of the College of Physicians of Philadelphia, Honorary Member of the Pharmaceutical Society, Physician and Lecturer on Pharmacology and Therapeutics to St. Bartholomew's Hospital, has just been published by the Macmillan Company, under the title of "Lectures on the Action of Medicines."

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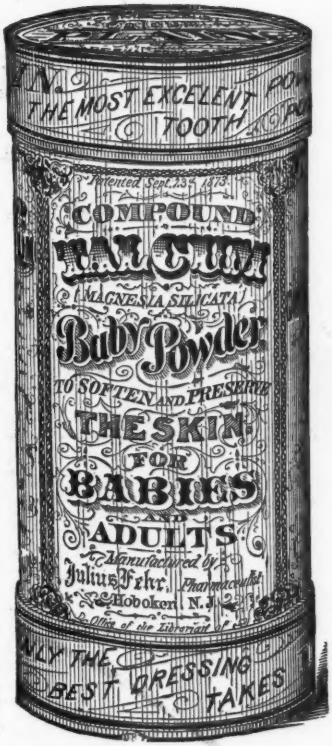

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"Among the most recent work taken up by the city Board of Health is that of making a daily medical inspection of the public and parochial schools, detecting cases of contagious disease and giving timely professional advice to the teachers concerning children who may be too ill to remain in school for the time being.

"There being frequent need for looking into the children's throats, I looked about to find something for a tongue depressor which could be used once and destroyed, and thus get rid of the danger of communicating any disease from one pupil to another, as well as to avoid unfavorable criticism upon that score. After looking over many clever devices, I at last found the hint to the successful article which I have caused to be manufactured and used by our medical inspectors. These little pieces of clean pine are without objection in use or appearance, and will burn as easily as a match, which is the intended destiny of each after being used once."

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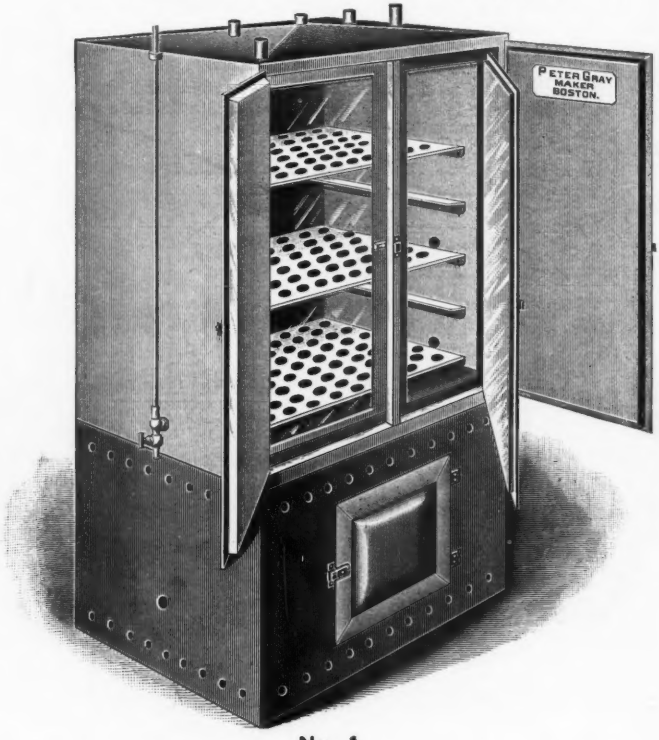

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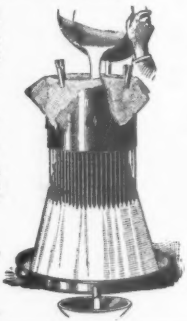

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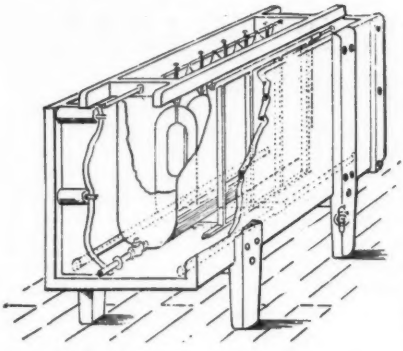

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Extracts from the Boston Herald of August 1, 1897.

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(Signed)

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L. L. BRYANT, *Asst. City Physician.*
JAMES A. DOW, M.D.
ALBERT L. NORRIS, M.D.
CHARLES E. VAUGHAN, M.D.
W. J LA MARCHE, M.D.
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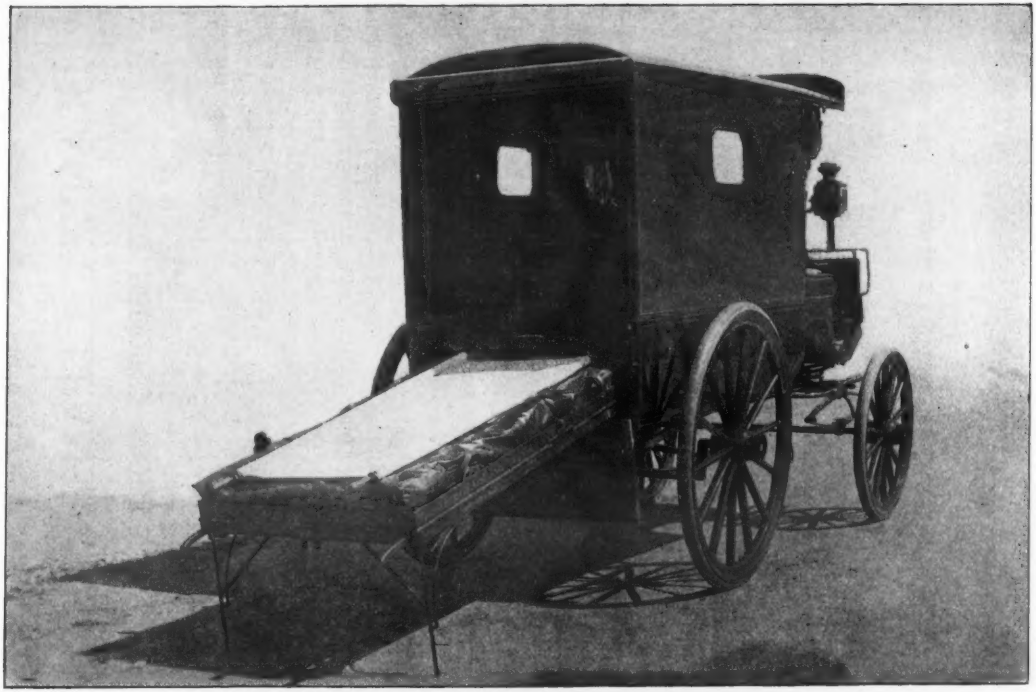

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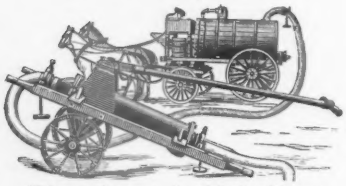

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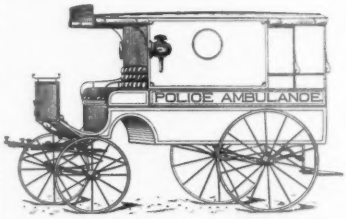

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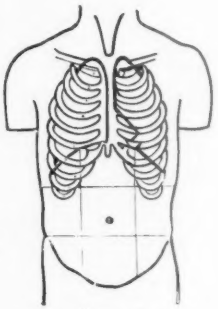

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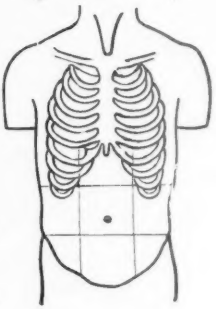

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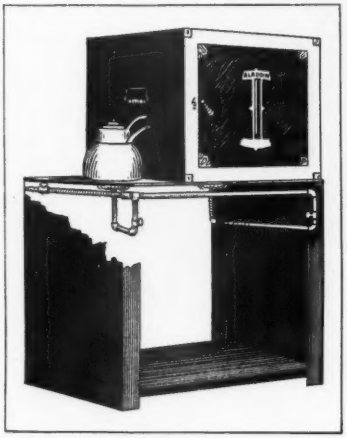

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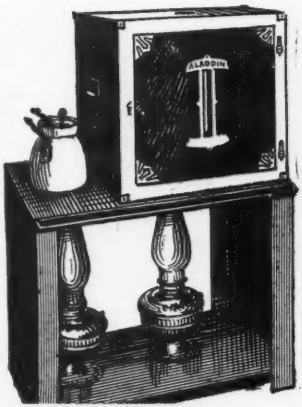

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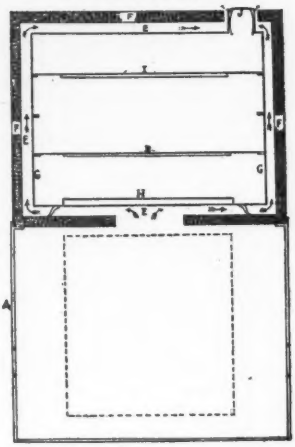

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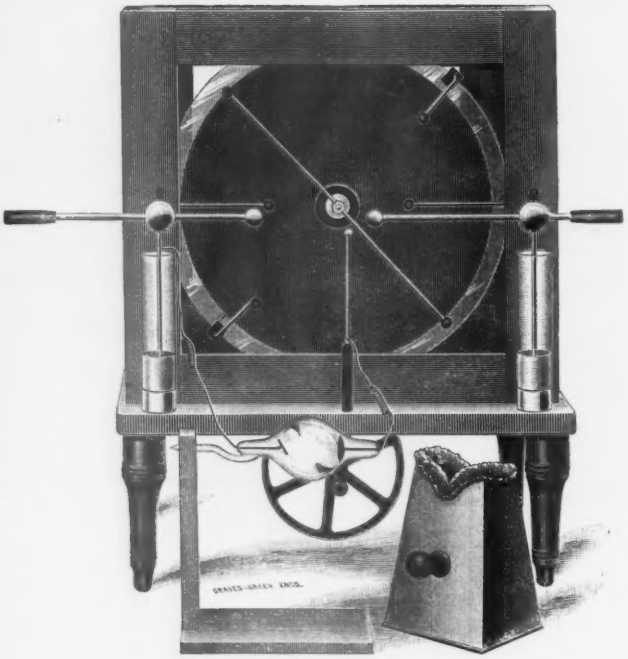

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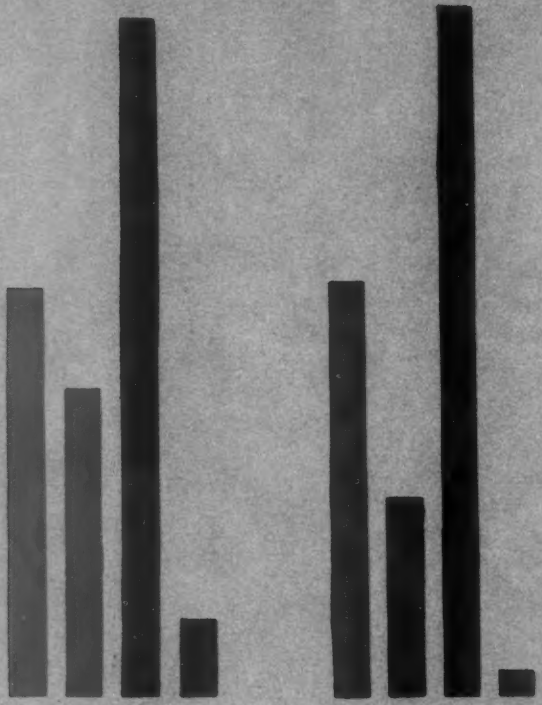

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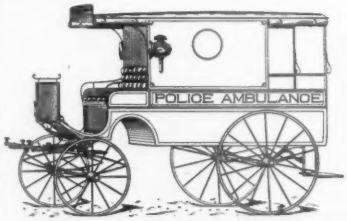

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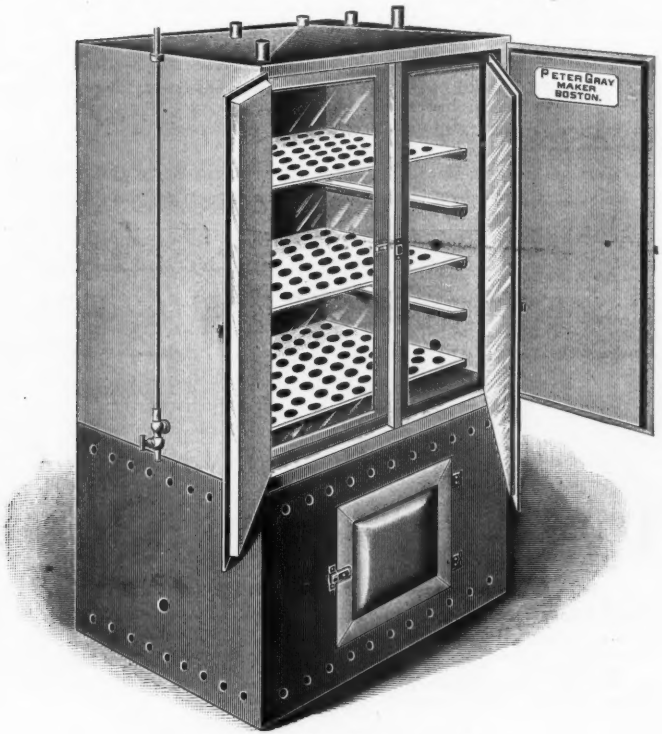

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